

What is claimed is:

1. A catalytic decomposition propulsion system, the system comprising,

a propellant tank for storing a propellant,  
a control valve for controlling the passage of the propellant, the control valve operating in a first state and a second state, the control valve passing a first amount of propellant in the first state during a first time period and passing a second amount of propellant in a second state during a second time period, the first amount being greater than the second amount, and

a decomposition chamber for supporting a catalyst for reacting with the propellant for decomposing the propellant into a gas.

2. The system of claim 1 wherein,

the first state is an opened state,  
the second state is a closed state, and  
the second amount of propellant passed through the control valve during the second time is zero.

3. The system of claim 1 wherein,

the valve is continuously operated between the first and second states.

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4. The system of claim 1 wherein,

a majority of the sum of the first amount plus the second amount of the propellant passed through the control valve during the first and second time period decomposes during the second time period.

5. The system of claim 1 wherein,

ninety percent of the sum of the first amount plus the second amount of the propellant passed through the control valve during the first and second time period decomposes during the second time period.

6. The system of claim 1 wherein,

a current rate of decomposition of propellant in the decomposition chamber increases when the control valve changes from the first state to the second state.

7. The system of claim 1 wherein the decomposition chamber comprises,

a plurality of chamber bed having respectively sized particles of the catalyst.

8. The system of claim 1 wherein the decomposition chamber comprises,

a plurality of chamber beds having respectively sized particles of the catalyst, the chamber beds being graduated across a flow path through the decomposition chamber.

9. The system of claim 1 further comprising,

an injector manifold disposed between the decomposition chamber and the flow control valve, the injector manifold having a plurality of injector orifices for distributing the propellant into the decomposition chamber.

10. The system of claim 1 further comprising,

a recirculation tube for routing a portion of the gas into the injector manifold for pushing the propellant into the decomposition chamber.

11. The system of claim 1 further comprising,

a nozzle for exhausting the gas from the decomposition chamber.

12. The system of claim 1 further comprising,

a nozzle for exhausting the gas from the decomposition chamber, the nozzle having convergent portion, divergent portion and a throat portion, and

a throat valve disposed in the throat portion for controlling the rate of exhaust of the gas from the decomposition chamber.

13. The system of claim 1 further comprising,

an injector inlet for passing the propellant from the control valve into the decomposition chamber.

1 14. The system of claim 1 further comprising,  
2 a distribution manifold disposed between the propellant tank  
3 and the control valve, and  
4 a flow control orifice disposed in the distribution manifold  
5 for limiting the flow of the propellant into the decomposition  
6 chamber.

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8 15. The system of claim 1 wherein,  
9 the propellant is a monopropellant.

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11 16. The system of claim 1 wherein,  
12 the propellant comprises hydroxyl ammonium nitrate.

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14 17. A catalytic decomposition propulsion system, the system  
15 comprising,  
16 a propellant tank for storing a propellant,  
17 a control valve for controlling the passage of the  
18 propellant, the control valve operating in a first state and a  
19 second state, the control valve passing a first amount of  
20 propellant in the first state during a first time period and  
21 passing a second amount of propellant in a second state during  
22 a second time period, the first amount being greater than the  
23 second amount,

24 a decomposition chamber for supporting a catalyst for  
25 reacting with the propellant for decomposing the propellant  
26 into a gas, and

27 an injector manifold disposed between the decomposition  
28 chamber and the flow control valve, the injector manifold

having a plurality of injector orifices for distributing the propellant into the decomposition chamber, and

a nozzle for exhausting the gas from the decomposition chamber, the nozzle having convergent portion, divergent portion and a throat portion, wherein:

the first state is an opened state;

the second state is a closed state;

the second amount of propellant passed through the control valve during the second time is zero;

the valve is continuously operated between the first and second states;

a majority of the sum of the first amount plus the second amount of the propellant passed through the control valve during the first and second time period decomposes during the second time period; and

a current rate of decomposition of propellant in the decomposition chamber increases when the control valve changes from the first state to the second state.

18. The system of claim 17 further comprising,

a recirculation tube for routing a portion of the gas into the injector manifold for pushing the propellant into the decomposition chamber,

a throat valve disposed in the throat portion for controlling the rate of exhaust of the gas from the decomposition chamber.

1 19. The system of claim 17 wherein the decomposition chamber  
2 comprises,

3 a plurality of chamber beds having respectively sized  
4 particles of the catalyst, the chamber beds being graduated  
5 across a flow path through the decomposition chamber.  
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7 20. The system of claim 17 wherein,

8 the propellant comprises hydroxyl ammonium nitrate.  
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